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ABSTRACT

The recent proliferation of technology in educational settings is giving teachers new and innovative methods of teaching an inquiry-based curriculum within a constructivist framework. One problem within the nation's schools is the growing cultural divide. The cultural divide is the extent of the cultural barrier that exists between educators and students of one culture with those of others. Current researchers are working to document the extent of the cultural divide and the methods of reducing this divide through technological innovations in preservice education programs, software development, and in the classroom. (Contains 27 references.) (Author/SM)

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Technology and the Cultural Divide: A Review of the Literature

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Abstract

The recent proliferation of technology in educational settings is giving teachers new and innovative methods of teaching an inquiry-based curriculum within a constructivist framework. One problem saddling our nation's schools is the growing cultural divide. The cultural divide is the extent of the cultural barrier that exists between educators and students of one culture with those of others. Current researchers are working to document the extent of the cultural divide and the methods of reducing this divide through technological innovations in preservice education programs, software development and in the classroom.

Technology and the Cultural Divide: A Review of the Literature

Very few educational researchers and practitioners would doubt the immense impact that instructional technology has had on education. From preschool to higher education, technology is at the forefront of educational thought and reform. As technology has grown and evolved over the last decade, many educators are turning to technology as a panacea for a variety of problems in education, including the reduction of the cultural divide that exists in educational settings. The cultural divide is the cultural barrier that exists between educators and students of one culture with those of others. In school settings that embrace cultural awareness, students, teachers and the community understand that unique cultural and ethnic heritages exist. They respect and appreciate cultural diversity and promote a culturally responsible and responsive curriculum (National Association of Multicultural Education, 2003).

Statistics regarding multicultural education outline the need for technological assistance in bridging the cultural divide. In 1998, 40 percent of the total school populations in the United States were minorities (National Center for Educational Statistics, 2000). By 2000, immigrants accounted for 8.6 million school-age children in our schools. The number of school age children who spoke a language other than English rose from 1.3 million in 1979 to 2.4 million in 1995 (Federal Interagency Forum on Child and Family Statistics, 2002). National statistics regarding computer use for multicultural students are equally compelling. According to a recent report by the U.S. Department of Commerce (2002) Whites, Asian Americans and Pacific Islanders have had higher rates of both computer and Internet use than Blacks and Hispanics. These numbers indicate

that cooperative and culturally diverse learning experiences between these groups are difficult to achieve due to a lack of technology.

Other compelling statistics call for cultural reform. As the world's populations become more interconnected, students more than ever need to understand the global community. In 1994, the National Council for the Social Studies established a broad set of standards related to global interdependence. However, only a few states and school districts have established graduation requirements related to global education. A report from the National Center for Education Statistics (NCES, 2002) shows that only seven states require either world history or world geography for graduation. Only fifteen require a foreign language for graduation. Other statistics indicate that the nation's educators are doing a poor job in teaching cultural awareness. According to the College Board (2002), student scores on Advance Placement exams that assess global issues are marginal at best. On a scale of 1 to 5, with five being the highest, the mean grade on the European History exam is 2.87, while the mean score on the Human Geography exam is 2.92.

Several researchers have sought the answers to why the cultural gap is so large in America's schools. An excellent study by Neuman and Bekerman (2001) surmises that there is a large gap between an educator's practice of pedagogy and the dominant cultural influences that can inhibit learning. Doering (1997) found that a sample of 6th grade students in one school had an extremely low level of cultural awareness, mainly due to teachers' reliance on standard geography books that did an adequate job of teaching physical geography, but did little to promote geographic influences on cultural development. Bennett (1997) concluded that students did not learn about global issues

because many teachers view geography as a collection of facts. The traditional world geography units taught by these teachers often reinforced students' misconceptions of the global community rather than helping them understand other people's behavior.

These statistics, reports and studies indicate that there is an urgent need for cultural reform in educational settings. Unfortunately, most technological studies involving cultural issues focus primarily on the digital divide. These include Katsinas, Stephen and Moeck's (2002) work with rural community colleges and Davis and Trebian's (2001) excellent work with Native Americans. Reports regarding technological impacts in reducing the cultural divide are more difficult to document. This review of the literature will explore recent technological studies that relate to cultural issues in educational settings, including efforts to reduce attitude bias and cultural stereotyping in preservice teacher programs, questions of software bias as a contributor to the cultural divide, and technological innovations in pedagogy that contribute to reduction in the cultural divide.

Cultural Bias, Technology and Preservice Teacher Programs

Questions raised in reports documenting the digital and cultural divide convey the existence of cultural bias in preservice teacher programs. A study by Abt-Perkins, Hauschildt and Dale (2000) documents the absence of supervising teachers and professors in bringing cultural issues to the forefront of the preservice teacher training. Another study by Horm (2003) documents training program's need to ensure that teachers are prepared to work with children from a range of cultural backgrounds.

Other researchers are actively conducting studies to examine how technology can positively affect preservice teachers attitudes towards teaching culturally diverse students. However, the results are mixed. One quantitative study examines the effects of website technologies on influencing preservice teachers knowledge and attitudes towards culturally diverse groups. The study by Calandra, Fitzpatrick and Barron (2002), created as a response to a 1994 Florida legislative bill, involved the creation of a web-based instructional program called The Teacher's Guide to the Holocaust. The researchers created the site as a single starting point for preservice and inservice education, providing a historical perspective and links to effective teaching practices for sensitive issues like the Jewish Holocaust.

The researchers' purpose was to investigate whether interaction with the site would significantly change preservice teachers' factual knowledge and attitudes towards traditionally marginalized groups. Hypothesizing that the results would show significant change, the researchers used a pretest-posttest control group design, randomly assigning participants to either an experimental group which used the Holocaust website and a control group which was instructed without the website. In the study, 143 undergraduate preservice teachers from a Florida University took part through their enrollment in an undergraduate educational technology course. Study demographics included 72% female, 28% male, with 70% of the participants classified as white, 13% classified as African American, 13% as Hispanic and 1% each as American Indian and Asian descent. The researchers used a multiple-choice pretest/posttest developed by the website designers, with a reliability reading of .77 for the pretest and .68 for the posttest. They

constructed an attitude scale to measure the students' tendencies for bias and general attitudes towards diversity.

Unfortunately, the results of the study do not support the researchers' hypothesis. Using two factor ANOVAs for data analysis, including an analysis of score differences among various demographic groups, the results indicate that exposure to the website does not have a significant impact on either the factual knowledge or the attitudes of the subjects. However, the researchers caution against using these results as a deterrent for incorporating web-based instruction in these types of courses. They cite design flaws including different instructors teaching the control and experimental groups and a pretest/posttest that, according to the researchers, had distracters that were either too easy or too difficult to prove reliability. The reviewer contends that the researchers should have colleted additional qualitative data to determine site design flaws and to ascertain student's prior attitudes, personal or otherwise, towards the Holocaust.

Sweeney (2001) conducted a much more comprehensive qualitative study regarding the use of technology to help close the cultural divide. Focusing on science technology system (STS) education, the researcher takes the stand that preservice teachers need to be convinced that multicultural science education/STS approaches make sense within their own conceptions of science teaching. Like the Calandra et al. (2002) study, Sweeney argues that technology can be an effective means of illustrating and addressing the moral issues that occur in multicultural classroom settings. Sweeney's research questions involved ascertaining the perspectives of preservice science teachers regarding the principles and goals of multicultural science education and determining whether an instructional approach that emphasizes the importance of multicultural

science education and STS have an influence on their perspectives and attitudes regarding these issues.

In the study, Sweeney taught five undergraduate science education classes at a four-year university over a one-year period. Typical students were preservice middle/high schoolteachers. In all, 137 students participated in the study. Study demographics show that 84% of the students were female and 14% of the students were minorities, representing African American, Hispanic and Native American cultures. The researcher chose a technological simulation model for HIV transmission for the study, allowing students to see, through chemical analysis, how easily one infected person can infect another. Using an interpretive methodological approach consisting of pertinent memoranda of class discussions, student reaction papers and transcribed oral interactions between the researcher and the students, the researcher found an overall greater resistance to the concepts of multicultural education, especially among secondary preservice teachers. The researcher found a distinctly lower level of resistance in elementary science teachers. However, regarding the use of STS instruction coupled with the teaching of moral issues, elementary teachers were more resistant, many citing lack of technical knowledge and an unwillingness to discuss such issues in the classroom.

While the Sweeney (2001) and Calandra et al. (2002) findings show that problems with cultural bias exist in preservice teacher programs and that technology tends to have little impact on changing cultural bias, the Anderson (1998) study is in marked contrast. Like the other studies, Anderson sought to determine whether preservice teachers in an undergraduate technology course would change their perceptions of multicultural education when exposed to a multicultural unit that incorporates computer software,

videodiscs and print media. The mixed qualitative/quantitative study involved 32 Caucasian females from a small, private university. Before the study, students completed a pen and paper survey that assessed their attitudes about various potential workplaces, including public schools with a predominately Caucasian population, African American and/or Hispanic population. Throughout the course, the instructors exposed the students to multicultural issues through the technological media. Students also participated in field observations at multicultural schools. Statistically significant results indicate that the students' attitudes did change, concluding that it is important to have an ethnically diverse population in the classroom and that their own attitudes towards multicultural populations were positively altered. In addition, interview comments positively chronicled the preservice teachers' need to design lessons that consider these populations.

The Beckett et al. (2002) study takes the Anderson (2002) study one step further. Unlike the previous studies, the researchers did not intend to measure preservice teacher's attitudes towards teaching culturally diverse populations. Their goal was to determine how effective a technological development program called Practicum Plus was in preparing mentor teachers and their university preservice teachers to create a technologically enhanced multicultural curriculum unit. The population sample consisted of two groups: (1) 19 university students who were in the semester before teaching and (2) 24 inservice teachers serving as mentors. Using a pretest and posttest survey, the researchers found that the mentor teachers and the preservice students increased their trust throughout the semester and were able to create effective multicultural units through technology. In comparison to units created in prior years, the units included the TESOL standards, which helped the teachers meet the needs of second language learners.

Other progressive studies, while already assuming that ignorance of cultural diversity exists in education schools, seek to use technology as means of bringing cultural diversity issues into the university classroom. This includes a qualitative study by Rosaen (2002), which examined the design and use of hypermedia to investigate language use in culturally diverse settings. The study involved four preservice teachers in an integrated teacher education methods course. The researcher's purpose was to determine what learning opportunities were available to preservice teachers as they used hypermedia materials to investigate language use in culturally diverse classrooms. In addition, they sought to determine the content explored by the group and the process the group engaged in to understand the material. The group consisted of one male and three female teachers, all white and from middle class backgrounds.

The group's task was to access a variety of materials by computer, including videotapes and transcripts of lessons, student notebooks and quizzes; the teacher's journal, the school district curriculum guide and the students' standardized test scores. The group created an electronic notebook to record their questions and ideas. This notebook subsequently served as the data for the study. Other data points included each preservice teacher's written position statement about the classroom teacher's role in helping students use oral language to explore mathematical ideas, a progress report that include the four preservice teacher's self-rating of their participation in the project and an open-ended course evaluation. Through observation of the media and discussions, the group sought to determine the classroom teacher's interactions with students, whether she acted differently towards culturally diverse students and how the classroom teacher used a multicultural perspective in her lesson plans.

The preservice teacher's observations are very interesting. They quickly connected learner diversity with the development of a comforting and supporting learning environment. They also speculated on actions such as the teacher's use of long pauses when engaging ESL students and the teacher's longer length of time engaging with the culturally diverse students. The researchers concluded that while the preservice teacher's barely scratched the surface of understanding diversity issues and strategies in the classroom, they began to take an inquiring stance, achieved through technology, towards diversity and they were able to share their thoughts and insights regarding their growth.

These studies show that the research regarding technological uses to close the cultural divide in preservice education programs is varied. Many, including the work of Anderson (1998), Beckett, et al. (2002), and Rosaen (2002), show that technology can play a positive role in changing preservice teachers' attitudes regarding multicultural populations. While the works of Calandra et al. (2002) and Sweeney (2001) failed to support their hypotheses of positive technological effects on building cultural awareness, their belief in the methodology remains. It is clear that if education schools were to combine these researchers' methods and ideas in a culturally sensitive learning environment, it is probable that this newly enlightened faculty would create quality technologically sound multicultural programs.

Cultural Bias and Software Issues

Besides teacher education programs, critics traditionally single out the field of educational software games development as a contributor to education's cultural divide.

Many researchers seek to prove that manufacturers design today's software game programs with little regard to multiculturalism and that their shortcomings may serve to not only meet the needs of culturally diverse students, but also to develop stereotypes among students. Bigelow's (1997) critique suggests that popular titles, such as Oregon Trail, present issues in a white, male perspective, leaving culturally students struggling to make connections, and white students ignorant of minority contributions. Similarly, Guzman's (2002) commentary on software sensitivity paints the main character in the popular title, Where in the World is Carmen Santiago, as a villainous thug who spreads sexism and other forms of bias.

Cox (2001) offers a somewhat more of a scientific approach to software inequities. She surmises that cultural diversity among learners requires today's designers of educational software to consider the impact of culture on these populations, the content of the knowledge, the criteria for evaluation and the process of acquiring knowledge and skills. Cox discusses the distinction between language as translated and language as experienced in a given culture. For example, while those in Western cultures are quite free to provide an answer of "no" during instruction, the Japanese are reluctant to give a negative answer and prefer to remain noncommittal.

Other researchers have published editorial reviews of software under the guise of qualitative research. Miller-Lachman (1996) presents a study of third grade students' reactions to material presented in a variety of multicultural software material during a rainforest unit. Her conclusions surmise that most software programs do not adequately address diverse cultures and actually lead to the creation of social bias in school-age

children. However, the paper provides no scientific research to support her opinions and simply serves as a sounding board for her political views.

Indeed, there are valid studies that offer some credence to the conclusions presented by Guzman (2002), Bigelow (1997), Cox (2001) and Miller-Lachman (1996). A study by Avarez-Torres, Mishra and Zhao (2001) investigated whether culturally diverse ESL students stereotype a multimedia computer tutorial as being native or non-native, and how this perception affects student achievement. Participants in the study, 16 adult males and 16 adult females of Chinese (n=8), Korean (n=14), Japanese (n=8), Cantonese (n=1) and Thai (n=1) birth and enrolled in a university ESL program worked on two versions of a language tutorial. Designers called one program "Susan", an Anglo-Saxon name and the other "Carmen", a Spanish name. The content was the same, however the program called "Susan" used audio delivered with a Midwestern accent, while the program called "Carmen" delivered audio with a fluent, non-native Spanish accent. In addition, the "Susan" program prominently stated that it was developed in the USA while the "Carmen" program stated that it was developed in Mexico.

The results, analyzed by t-test, indicate that participants in the native program ("Susan") recalled significantly more information than in the non-native program ("Carmen"). While the researchers tested other demographics such as gender, country of origin and prior knowledge with no significant difference, the study has serious validity concerns due to the small population sample. However, the manipulation of the program to test cultural differences could eventually be a common technique to test for software bias.

Other researchers offer solid evidence for differences among cultures and call for renewed design to close the technological bias that developers employ. Faiola (2002) makes a very solid case for the creation of a culture-based profile in order to support ongoing research and application for developers of educational media programs that span international boundaries. He completed a pilot study that assumed differences in the visualization processes between American and Russian populations due to unique pedagogical influences in their cultures. Using a randomly selected subject sample of 37 American and 37 Russian students from Purdue University and the Institute of Fine Mechanics and Optics in St. Petersburg, Russia, Faiola used a variety of data collection techniques to test his hypothesis. The subjects carried out one major task containing three stages. The stages were visualization, graphicalization and digitalization using computer graphic applications. The researchers used think-aloud techniques for qualitative analysis to perform and transcribe the study. In addition, they administered a posttest that asked specific questions pertaining to the mental imagery that each subject visualized during the task exercises.

The results of the study clearly indicate that preferences of academia vary greatly between the two culture groups. Whereas the Russian students showed a preference in math engineering, psychology and language in both elementary school and college, the Americans showed a preference in the arts, humanities, science and reading. Russians in elementary settings showed dominance towards math over other subjects 69% of the time, while Americans showed math dominance only 33% of the time. Personality tests showed a Russian tendency towards leadership while the Americans favored managing, planning and working in team environments.

These findings offer incredible insight into how software planners and technology curriculum developers need to address cultural diversity in their approach to pedagogy. Those with math and engineering preferences, like the Russians in the study, learn better through technological design tasks in which they do not generate, hold and manipulate imagery. These creative pursuits are, according to this research, more suitable for American minds.

While the Alvarez-Torres et al. (2001) and the Faiola (2002) studies show that there can be variables in software that adversely influence student achievement and cultural perception, much of current research shows that today's software and web applications are working to not only close the world's multicultural divide, but also to provide valid learning experiences for students and teachers. Lu, Walker and Huang (1996) qualitatively examined six popular software titles from Asian companies that produce software for both the Asian and U.S. markets. The researchers initially reviewed the titles themselves in order to look for cultural similarities and difference. Then, they asked inservice and preservice teachers from the U.S. and Taiwan to review the titles using a 21-item software review checklist. The Taiwanese reviewers comprised 18 males and 24 females. Other demographics show that 22 were middle and secondary students, 8 were college professors and 12 were graduate students with teaching experience. The 22 American reviewers were preservice and inservice teachers enrolled in teacher education courses at a university. Two-thirds of them were elementary teacher candidates.

The study concluded that Asian and American educational software produced for the global markets were not significantly different. None of the titles presented any

glaring stereotypes and both groups of teachers felt confident that the software would not enhance cultural bias. Indeed, while the study would be more compelling if the treatment groups were more evenly matches by including only inservice teachers from a particular grade range and by including data on changes in students' attitudes, it shows that efforts to develop culturally sensitive educational software may be working.

Like many topics in educational technology, the research examining cultural bias issues in computer based instructional software vary among researchers and the software they examine. Most would agree that cultural bias is possible and that guidelines for reducing this bias are warranted. However, the research is unclear regarding whether culturally insensitive software actually contributes to changing student's perspectives on cultures other than their own. The reality is that few educators would rely upon computer based learning games as the sole means of exposing their students to cultural diversity that exists in our world. Instead, they would use a variety of distance learning tools to work on closing the cultural divide.

Closing the Cultural Divide through Technological Innovation

While many of the previously reviewed studies sought to either provide evidence of or disprove cultural bias in preservice education environments and software programs, others seek ways to illustrate technological impacts on closing the cultural gap in multicultural education. These impacts are achieved with web-based learning, hypermedia/multimedia, learner control and simulations. The consistent thread in these studies is the creation of inquiry-based, constructivist learning environments rather than

reliance upon computer-based software to promote diversity issues. Most agree that in order to facilitate a broad worldview, educators need to provide a collaborative learning environment, with distance learning technology at the forefront. These researchers draw on a wide body of prior studies to support their initial hypotheses. Most cite the work of social constructivists like Vygotsky (1978), Dewey (1938) and Maslow (1973) who contend that as individuals grow through education, they transform into responsible and caring world citizens.

One comprehensive study by Herron, Dubriel, Corrie & Cole (2002) examines the effects of using video, combined with traditional text study, to enhance cultural knowledge in an intermediate French class. Using the terms little "c" to represent aspects of daily lifestyle and big "C" to represent civilizations accomplishments in literature, fine arts and social institutions, the researchers sought to determine, among other research questions, the following: (1) Does the students' overall knowledge of French culture improve with journalistic video? (2) Do the students' retain more cultural practices (little "c") over cultural products (big "C") with journalistic video? and (3) What are the students' perceptions of the cultural practices and cultural products as presented in journalistic video? The participants included 51 university students enrolled in four sections of a fifteen-week, third semester French class. Four different teachers taught the four classes. One teacher was a native speaker of French and the other three were non-native speakers of French. Chi-square analysis showed no statistically significant differences between the groups by gender or previous years of formal French instruction.

The research designers used eight target videos for the study. They created two treatment groups, one group with the teacher employing the video as advance organizer

and one group using with the text only. Data included a pretest and posttest as well as a cultural questionnaire given at the end of the semester analyzed through t-tests and ANOVA. Results indicate that the students significantly improved their French and Francophone cultural knowledge with the video. They also indicate that those with more background in French had more recall of cultural information.

The Herron et al. (2002) study supports an earlier qualitative study by Wilson (1992). Using a combination of HyperCard and standard video programs, seven Canadian Native American and five Non-Native Americans, ranging from age 14 to 19, participated in a Computers and Culture project. The project was designed to both teach essential computer skills and to build an awareness of local Indian culture. Information gathered by the researcher indicates increased cultural awareness by the students and greater achievement using technology. In fact, the combination of distance learning and multimedia technologies proved effective in helping young adolescents make sense of their experiences and in promoting multicultural awareness. Students in both schools commented on their increased self-esteem through distance mentoring and data indicates a change in attitude towards students culturally different from themselves. Other results show increased comfort with technology and better teacher understanding of diversity. Unfortunately, the study contains numerous validity threats, including a small population sample and unsubstantiated findings.

Other current studies employ technological innovations to help reduce the cultural divide. An excellent qualitative study by Cifuentes and Murphy (2000) measured the effects of curricular and identity-forming multicultural activities for K-12 students. The study involved a program called Cultural Connections, which includes several

geographically dispersed teachers whose classes collaborate with each other and with their classes in other states and nations. Students use multimedia portfolios to establish cross-cultural classroom experiences and foster tolerance and diversity in the process. In this particular study, the teachers directed their students to create multimedia portfolios in HyperStudio. The students write about their home lives, their goals, their thoughts and values, their likes and their personal stories. The students also participated in videoconferences with the other students.

The researchers used a case study approach to investigate the outcomes of the Cultural Connections activities. Participants included two teachers and their students, three teacher-observers and two faculty researchers. One teacher was a Hispanic eighth grade language arts teacher from a school on the Texas/Mexico border. The other was an African American gifted and talented teacher for fifth and sixth grade students from a rural area west of Houston, Texas. Participants from the border school comprised 15 students, 14 of which were at-risk. Regarding race, 2 were Caucasian, and 13 were Hispanic. Gender demographics show 6 boys and 9 girls. Participants from the rural school comprised 10 students, all considered gifted and talented. Regarding race, 7 were Caucasian, 1 was Hispanic and 2 were African-American. Gender demographics included 5 boys and 5 girls. Data sources included multimedia portfolios of the border-school students, written reflections by teachers, students and university faculty and interviews with the students. The researchers used a color-coded approach to determine the effects of the distance learning on multicultural understanding and self-concept. Researchers triangulated the data and reached a consensus on the findings.

The results indicate that border-school students involved in the Cultural Connections project grew and matured in many areas, including increased cultural sensitivity. The combination of distance learning and multimedia technologies proved significantly effective in helping young students make sense of their experiences and have a greater sensitivity towards multicultural issue.

There are also ongoing broad-based technology projects that are striving to reduce the cultural divide. The International Communication and Negotiation Simulation (ICONS) project at the University of Maryland is an excellent example (Starkey, 1998). Researchers designed ICONS to provide project-generated scenarios that outline issues to be negotiated. Students, working in country teams, play roles, develop policies for negotiations and seek common answers through negotiation. Project administrators manage the open-ended scenarios and act as chairpersons for the talks.

The documented effects of the ICONS are extraordinary. One study involved Israeli and Palestinian university students engaged in a conflict resolution experiment using ICONS. Encouraged to portray the other side, students learned to define the term neighbor and understand the perspective of what their culture had historically defined as an enemy. Through qualitative analysis, researchers observed students learning that bordering states must cooperate in order to exist and survive. Many of the students described the experience as cathartic and generally agreed that the perspectives from each side shared common fears and emotions (ICONS, 2003).

Other studies show positive results in closing the cultural divide using Internet-based culture portfolios. Abrams (2002) conducted a study examining online dialogue with 68 intermediate university students in four sections of a German language course.

The researcher divided the students into a traditional group and an experimental group. Those in the experimental treatment carried out online interviews with native informants, while those in the traditional group did not participate in the online portion of the class. Using a post-project questionnaire analyzed through ANOVA, the researchers determined that most of the students in the experimental group were able to significantly develop heightened sensitivity to diversity within the cultures of German-speaking countries.

Other studies indicate that not all forms of technology are effective in reducing the cultural divide. Wang and Sutton (2002) investigated the effectiveness of using learner control to assist Taiwanese college students in learning about American Culture. The participants in the study were 81 undergraduate students, 70 female, enrolled in an elective computer education course. The students' age range was 20-48 years old with a mean age of 25. All of the participants were ESL students.

The researchers used an online learning model called the American Culture Online Learning Center. The model simulates an American shopping mall and provides experiences in American culture. The two random treatment groups were learner control with advisement and learner control without advisement. Those in the advisement group could choose all hyperlinks in the program and could navigate the glossary of vocabulary. All students completed a pre and posttest and a wrap-up survey that included questions on motivation to learn new cultures.

Results, tabulated through ANOVA, indicate that learner control, both with and without advisement, has no bearing on students' motivation to learn other cultures. The researchers admit that, because their methodology for achieving motivation involved awarding extra credit rather than awarding of a grade, students had little personal interest

in learning American culture. However, based on the results of studies of the Herron et al (2002), Wilson (1992) and others, the researchers did not achieve positive results because their program lacked interactive and constructivist methodology.

Conclusion

A number of compelling statistics and government reports indicate the existence of a cultural divide in our nation's schools. The research examining technological innovations as a means of reducing this cultural divide has many implications for our nation's educators. Some studies, such as those conducted by Apt-Perkins, et al. (2000), Sweeney (2001), Alvarez-Torres, et al. (2001) and Faiola (2002) tend to document the problems of cultural bias in preservice education programs and computer based software design. However, the majority of recent studies tend to favor solutions to closing the cultural divide. These include forward thinking studies by Calandra et al. (2002), Anderson (1998) Herron et al. (2002) and Cifuentes and Murphy (2000). It is evident that the technological solutions that most effectively work to close the cultural divide involve students experiencing other cultures through real-life dialogue and the sharing of common experiences, problems and solutions. Indeed, this is the basis of constructivist thought and inquiry-based learning that needs to become commonplace in our preservice education programs, computer software design and our schools' daily curriculum.

Studies for Future Consideration

These studies create many questions for future research. Primarily, teacher education programs must create environments that embrace cultural diversity and a global perspective. They need to adjust their curriculum to provide young teachers with the tools to help their own students experience diverse cultures and international perspectives. The advent of distance learning through the World Wide Web is the obvious tool for meeting this challenge. These experiences, when led by a trained teacher, are constructivist in ideology, inquiry based, and involve real life challenges. Researchers are charged with finding the methods that most significantly achieve these goals. Other research needs to occur that gives educational software designers clear guidelines and methods for not only creating culturally sensitive materials, but also for creating programs that can effectively expose students to culturally unique situations.

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